

TRANSPORTATION AND THE ECONOMY

TRANSPORTATION IS A MAJOR SECTOR OF THE U.S. ECONOMY. IT USES CONSIDERABLE PRIVATE AND PUBLIC CAPITAL, EMPLOYS MILLIONS OF WORKERS, AND CONSUMES RESOURCES AND SERVICES PRODUCED BY OTHER SECTORS IN ORDER TO MOVE PEOPLE AND GOODS TO THEIR DESTINATIONS. IN 1994, TRANSPORTATION-RELATED FINAL DEMAND ACCOUNTED FOR 11 PERCENT OF THE TOTAL VALUE OF U.S. GROSS DOMESTIC PRODUCT (GDP).

To capture the rich interplay between the transportation system and the larger economy that it serves, many types of measurements are needed. Physical measures, depicting the output and capacity of the U.S. transportation system—for example, tons of goods moved and number of people carried—are detailed in chapter 1. Physical measurement alone, however, cannot illustrate the value society places on transportation. Measures of the various economic dimensions of transportation are better gauges of trans-

portation's contribution to the overall economy.

This chapter opens with a discussion of the measures of transportation's importance to the economy and society as indicated by 1) transportation's share of gross domestic product and 2) its share of consumer and government expenditures. The chapter also discusses employment and productivity trends and cost structures in the transportation sector. Finally, it describes changes in revenue and expenditure patterns in the trucking and

As a proportion of GDP, transportation-related final demand has remained stable since 1989, suggesting the importance of technological change and productivity growth in the transportation sector.

railroad industries. The commercial aviation industry is discussed in detail in appendix A of this report.

To help explain transportation's contribution to the U.S. economy, the Bureau of Transportation Statistics (BTS) is developing several new approaches. First, it is combining existing statistics in ways that better illustrate the family of industries that make up the transportation sector. Second, in cooperation with the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), BTS is seeking to improve and expand existing statistics and build a new accounting structure for transportation consistent with the system of National Income and Products Accounts (NIPA).¹ The new accounting structure, called a "satellite account," will provide more comprehensive information on U.S. transportation. The scope of the Transportation Satellite Account (TSA) is described in this chapter.

The Economic Importance of Transportation as a Component of GDP

The importance of transportation in the economy can be shown in two ways: 1) as the share of transportation-related final demand in GDP,² and 2) as the share of value-added generated by transportation activities in GDP. Each measure presents a different perspective on transportation's economic importance. The use of both measures provides a more accurate and complete picture of transportation's contribution to the U.S. economy.

¹The NIPA is a summary of the nation's economic income and output and the interaction of its major components. BEA collects NIPA data.

²GDP is defined as the net output of goods and services produced by labor and property located in the United States, valued at market prices. As long as the labor and property are located in the United States, the suppliers (workers and owners) may be either U.S. residents or residents of foreign countries.

This section will first discuss the share of transportation-related final demand in the GDP. The section then examines the contribution of the transportation industry to the GDP, focusing on the "for hire" component of the industry, which had a value-added contribution of \$207.9 billion to GDP in 1993. Focusing on the for-hire segment, though, undercounts transportation's contribution, as explained below. Thus, the section discusses the TSA, the aim of which is to provide better measures of the contribution of transportation to the economy. Finally, transportation services as an intermediate input to production are examined, focusing again on the for-hire component of the transportation industry, but also analyzing the direct and indirect intermediate inputs of transportation to a variety of industries.

► Share of Transportation-Related Final Demand in GDP

Transportation-related final demand is defined as the value of all transportation-related goods and services, regardless of industry origin, delivered to final demand. Components of final demand include consumer and government expenditures (discussed in more detail later in the chapter), investments, and net exports.

Transportation-related final demand is a measure of the overall economic importance of transportation as a social function—a far broader measure than the contribution of the transportation industry³ to GDP alone.

³The transportation industry can be thought of narrowly as comprising for-hire transportation services, or broadly as consisting of all business activities that are needed to carry out the social function of transportation. Under the broad definition, the transportation industry includes those establishments or parts of establishments that: 1) build transportation facilities and equipment; 2) operate transportation facilities; 3) provide for-hire transportation services for individuals, households, businesses, or government agencies; 4) provide supporting in-house transportation for a business or government agency; 5) arrange for the provision of transportation services; or 6) administer transportation programs. The broad definition includes a diverse cross-section of the economy, such as railroads, travel agents, school district bus operators, port authorities, gas stations, and the trucking fleets of major grocery chains.

**TABLE 2-1: U.S. GROSS DOMESTIC PRODUCT
ATTRIBUTED TO TRANSPORTATION-RELATED DEMAND, 1989-94**
(BILLIONS OF CURRENT DOLLARS)

	1989	1990	1991	1992	1993	1994
Personal consumption of transportation	\$439.1	\$453.7	\$434.6	\$466.3	\$504.2	\$538.0
1. Motor vehicles and parts	205.6	202.4	185.5	204.1	228.0	251.2
2. Gasoline and oil	95.5	108.5	102.9	105.5	105.6	107.2
3. Transport services	138.0	142.8	146.2	156.7	170.6	179.6
Gross private domestic investment	79.6	88.3	88.1	95.2	108.8	124.6
4. Transportation structures	3.0	3.0	3.2	3.7	4.6	5.3
5. Transportation equipment	76.6	85.3	84.9	91.5	104.2	119.3
Net exports of goods and services	-33.3	-26.9	-15.9	-14.0	-24.8	-38.3
Exports (+)	92.6	106.0	114.8	124.8	124.8	132.8
6. Civilian aircraft, engines, and parts	26.6	32.2	36.6	37.7	32.7	31.6
7. Automotive vehicles, engines, and parts	34.9	36.5	40.0	47.0	52.4	57.6
8. Passenger fares	10.6	15.3	15.9	17.4	16.6	17.5
9. Other transportation	20.5	22.0	22.3	22.7	23.1	26.1
Imports (-)	125.9	132.9	130.7	138.8	149.6	171.1
10. Civilian aircraft, engines, and parts	9.6	10.5	11.7	12.6	11.3	11.3
11. Automotive vehicles, engines, and parts	87.4	88.5	85.7	91.8	102.4	118.7
12. Passenger fares	8.2	10.5	10.0	10.9	11.4	12.7
13. Other transportation	20.7	23.4	23.3	23.5	24.5	28.4
Government transport-related purchases	81.4	87.7	98.7	94.7	98.1	100.7
14. Federal purchases	9.6	10.4	11.8	12.6	13.1	12.9
15. State and local purchases	63.8	68.4	70.9	72.5	76.0	79.6
16. Defense-related purchases	8.0	8.9	16.0	9.6	9.0	8.2
Total final uses for transportation	566.8	602.8	605.5	642.2	686.3	725.0
Gross domestic product	\$5,250.8	\$5,546.1	\$5,724.8	\$6,020.2	\$6,343.3	\$6,738.4
Total transport in gross domestic product	10.8%	10.9%	10.6%	10.7%	10.8%	10.8%

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," 1994, National Income and Products Account data.

Tables 2-1 and 2-2 present transportation-related final demand and its share in GDP using current and 1987 dollars, respectively. In current dollars, GDP amounted to \$6.7 trillion in 1994, an increase of 6.2 percent from the previous year. Transportation-related final demand was \$725 billion in 1994, an increase of 5.6 percent from 1993. (USDOT BEA 1994)

Personal consumption is a significant component of transportation-related final demand. Its share was 74 percent in 1994, as shown in table 2-1. International trade in transportation-related goods and services consistently ran a deficit over the six-year period from 1989 to 1994, primarily as a result of lackluster automobile and parts trading. In contrast, trade of civilian air-

TABLE 2-2: U.S. GROSS DOMESTIC PRODUCT
ATTRIBUTED TO TRANSPORTATION-RELATED DEMAND, 1989-94
(BILLIONS OF 1987 DOLLARS)

	1989	1990	1991	1992	1993	1994
Personal consumption of transportation	\$407.5	\$403.3	\$373.6	\$390.3	\$410.5	\$428.1
1. Motor vehicles and parts	190.8	192.2	170.5	181.8	196.1	208.2
2. Gasoline and oil	88.6	86.4	83.1	85.6	86.5	87.2
3. Transport services	128.1	124.7	120.0	122.9	127.9	132.7
Gross private domestic investment	75.4	81.3	77.5	81.6	91.6	102.5
4. Transportation structures	2.8	2.8	2.8	3.3	3.8	4.2
5. Transportation equipment	72.6	78.5	74.7	78.3	87.8	98.3
Net exports of goods and services	-29.3	-25.1	-14.1	-12.4	-21.0	-30.5
Exports (+)	87.4	96.1	99.8	105.5	104.7	114.7
6. Civilian aircraft, engines, and parts	25.0	28.6	31.1	30.7	25.9	24.4
7. Automotive vehicles, engines, and parts	33.4	34.1	36.3	41.9	46.3	50.4
8. Passenger fares	9.7	13.4	12.7	13.2	12.6	16.0
9. Other transportation	19.3	20.0	19.7	19.7	19.9	23.9
Imports (-)	116.7	121.2	113.9	117.9	125.7	145.2
10. Civilian aircraft, engines, and parts	9.0	9.3	10.0	10.2	8.9	8.7
11. Automotive vehicles, engines, and parts	80.7	81.4	75.8	79.7	87.4	97.9
12. Passenger fares	7.8	9.2	7.8	8.1	8.8	11.9
13. Other transportation	19.2	21.3	20.3	19.9	20.6	26.7
Government transport-related purchases	75.8	78.7	86.6	80.4	81.0	80.8
14. Federal purchases	8.9	9.3	10.1	10.5	10.5	9.9
15. State and local purchases	58.8	60.4	60.6	60.4	61.8	63.1
16. Defense-related purchases	8.1	9.0	15.9	9.6	8.7	7.8
Total final uses for transportation	529.4	538.2	523.6	539.9	562.0	580.9
Gross domestic product	\$4,838.0	\$4,897.3	\$4,867.6	\$4,979.3	\$5,134.5	\$5,344.0
Total transport in gross domestic product	10.9%	11.0%	10.8%	10.8%	10.9%	10.9%

SOURCE: Based on U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," 1994, National Income and Products Account data.

craft and parts ran a surplus, with exports consistently about three times imports. Without the aviation surplus, the transportation-related trade deficit would have been even larger.

The categories of personal consumption of transportation presented in tables 2-1 and 2-2 show the kinds and quantities of products that were necessary to meet personal transportation

demand, including motor vehicles and parts, gasoline and oil, and transport services. These categories differ from those reported in the *Transportation Statistics Annual Report 1995*. The categories highlighted in last year's report—user-operated transportation, purchased local transportation, and purchased intercity transportation—were intended to show what

kinds of transportation services consumers bought, not which of the economy's goods and services comprised consumers' expenditures on transportation.

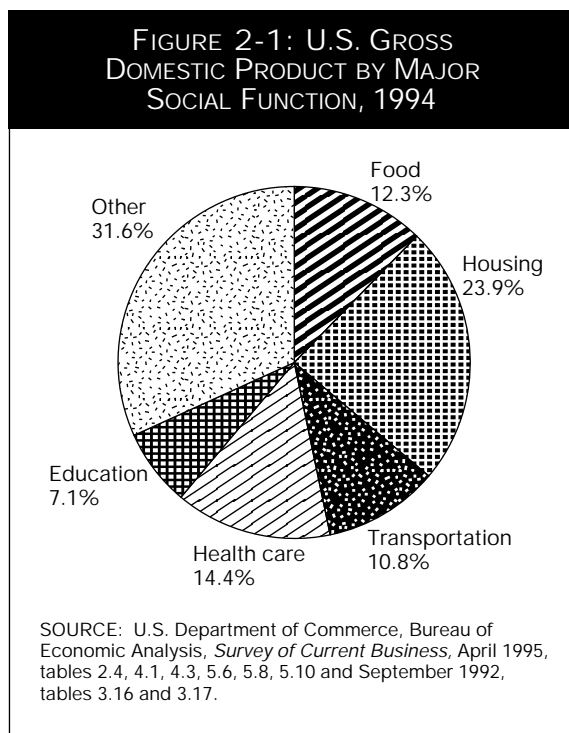
Transportation is one of many social functions or purposes supported by an economy's GDP. Other major social purposes include food, housing, health care, and education.

Figure 2-1 presents a breakdown of GDP by major social function. Among these social functions, transportation's share in GDP ranks behind housing, health care, and food, but ahead of education. The share of health care in GDP increased from 12.4 percent in 1989 to 14.4 percent in 1994, while the share of food in GDP decreased from 13.1 percent in 1989 to 12.3 percent in 1994. The share of transportation remained almost unchanged (see table 2-3). This reflects the different characteristics of the goods and services required to support these functions. In general, the demand for food and food-related services have low income elasticity; that is, after demand reaches a certain level, an increase in income will cause a

smaller percentage increase in demand. In contrast, the demand for health care-related goods and services have high income elasticity; that is, at higher levels of income, proportionally more money will be spent on health care.

Between 1989 and 1994, personal mobility, freight traffic, and the globalization of the American economy increased substantially. Transportation output measured in passenger-miles and ton-miles grew faster than transportation output measured in dollars. In this context, the fact that transportation-related final demand remained stable as a proportion of GDP suggests the importance of technological change and productivity growth in the transportation sector. Productivity in the transportation sector is shown in figure 2-2, which charts the higher rate of growth of value-added per employee in transportation, compared to the overall economy.

► Share of Transportation in GDP Based on Value-Added Origination



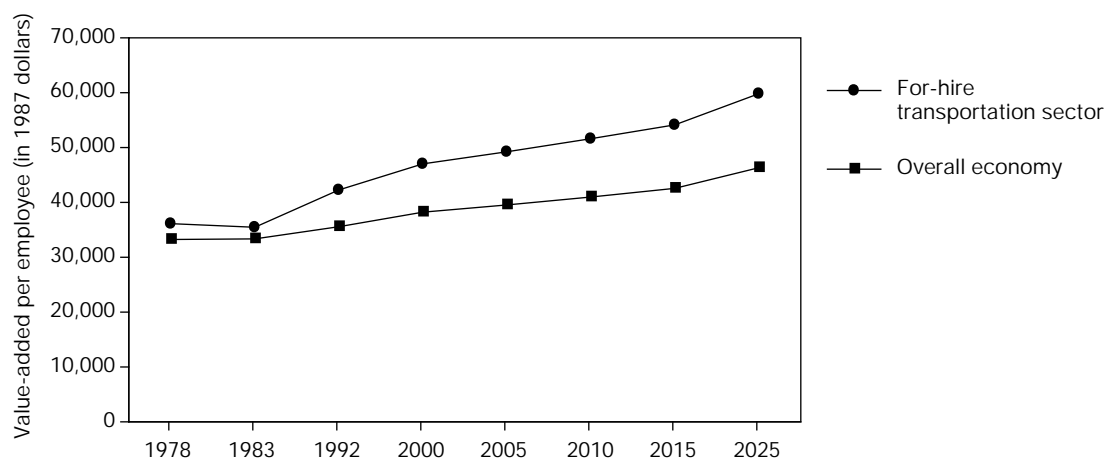
The share of transportation-related final demand in GDP is a good measure of the importance of transportation as an end demand (or function) in people's lives, national defense, and international trade. As already mentioned, however, it is not an accurate measure of the contribution of the transportation industry to GDP, because many other industries' products are also used to satisfy consumers' demand for transportation. For example, consumers purchase automobiles for transportation purposes. Thus, the value of automobiles is counted as a measure of how much GDP is produced for transportation-related final demand, or the importance of transportation in GDP. It is inappropriate, though, to count the value of automobiles as a contribution of the transportation industry to GDP, because cars are products of the automobile industry. Even at more aggregated levels of industrial classification, automobiles would be

TABLE 2-3: GROSS DOMESTIC PRODUCT BY MAJOR SOCIAL FUNCTION, 1989-94

	1989	1990	1991	1992	1993	1994
Billions of current dollars						
Food	685.3	721.7	740.5	755.9	786.8	825.5
Housing	1,271.6	1,298.8	1,313.1	1,401.8	1,501.8	1,610.6
Transportation	566.8	602.8	605.5	642.2	686.3	725.0
Health care	653.2	719.3	766.7	833.1	901.8	970.3
Education	370.1	397.8	419.7	437.3	454.4	477.4
Other	1,703.8	1,805.4	1,879.4	1,949.9	2,012.4	2,129.5
Gross domestic product	5,250.8	5,546.1	5,724.8	6,020.2	6,343.5	6,738.3
Percentage of Gross Domestic Product						
Food	13.1	13.0	12.9	12.6	12.4	12.3
Housing	24.2	23.4	22.9	23.3	23.7	23.9
Transportation	10.8	10.9	10.6	10.7	10.8	10.8
Health care	12.4	13.0	13.4	13.8	14.2	14.4
Education	7.0	7.2	7.3	7.3	7.2	7.1
Other	32.4	32.6	32.8	32.4	31.7	31.6
Gross domestic product	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," 1994.

FIGURE 2-2: TREND OF LABOR PRODUCTIVITY

SOURCE: Calculated from gross domestic product and employment data in U.S. Department of Commerce, Bureau of Economic Analysis, *BEA Regional Projections to 2045, Vol. 1, States* (Washington, DC: U.S. Government Printing Office, July 1995), p. 10.

counted as products of the manufacturing industry, rather than the transportation industry.

There is another reason why calculating transportation-related final demand as a component of GDP does not accurately reflect the industry's contribution to the economy. This is because products of other industries delivered to final demand for other social functions, such as housing, also contain values generated by the transportation industry. For example, when a consumer buys a new house, he or she pays not only for the land, materials, and labor, but also for the transportation required to deliver goods and services used in the construction of the house.

A proper measure of the contribution of the transportation industry to GDP is the value-added generated by transportation in the production of its total output, that is, transportation services used by all industries in their production, plus transportation services delivered to final demand.

Measuring the contribution of the transportation industry to GDP based on value-added origination, however, leads to undercounting it, given

the current system of industrial classification used in the NIPA. Table 2-4 presents the value-added contribution to GDP of several industries, including the for-hire component of the transportation industry. This component of the transportation industry includes only establishments that offer transportation services to the public for a fee—the so-called for-hire transportation industries. The share of value-added in GDP originating from for-hire transportation decreased in current dollars from 3.8 percent in 1980 to 3.3 percent in 1993 (the latest year for which data are available). This reflects increases in the prices charged for other industries' products rather than a decrease in the for-hire transportation's contribution to GDP. If constant dollars are used, the for-hire transportation's value-added contribution to GDP actually increased, reflecting the smaller inflation in the prices of transportation services as well as their relatively higher productivities.

Transportation-related GDP is undercounted from the industrial side because the value of private transportation is not included. Private transportation can be defined as transportation

TABLE 2-4: CONTRIBUTIONS TO GROSS DOMESTIC PRODUCT (GDP): SELECTED INDUSTRIES

	1980	1990	1991	1992	1993		1980	1990	1991	1992	1993
	Billions of current dollars						Billions of 1987 dollars				
GDP	2,708.0	5,546.1	5,724.8	6,020.2	6,343.3		3,776.3	4,897.3	4,867.6	4,979.3	5,134.5
For-hire transportation	102.9	176.8	183.7	193.8	207.9		120.2	168.9	175.0	183.7	193.5
Communications	68.9	146.7	154.2	162.1	169.8		94.4	140.8	148.2	153.8	158.9
Health care	111.5	304.4	335.2	364.4	389.4		196.1	241.4	248.0	252.0	255.3
Education	16.4	38.1	43.4	45.6	47.8		26.3	32.1	34.8	35.1	35.5
	Percentage of GDP						Percentage of GDP				
For-hire transportation	3.8	3.2	3.2	3.2	3.3		3.2	3.4	3.6	3.7	3.8
Communications	2.5	2.6	2.7	2.7	2.7		2.5	2.9	3.0	3.1	3.1
Health care	4.1	5.5	5.9	6.1	6.1		5.2	4.9	5.1	5.1	5.0
Education	0.6	0.7	0.8	0.8	0.8		0.7	0.7	0.7	0.7	0.7

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," May 1993, tables 9 and 12; October 1994, table 2; April 1995, table 1.

activities conducted by industries whose primary business is not transportation. Under the current industrial classification system of national accounts, the value of private transportation is counted as the output of an industry's primary activity, rather than as a transportation output.

► Transportation Satellite Account

The undercounting of transportation-related GDP based on value-added origination, noted above, results from including only the for-hire transportation industry and excluding the private transportation of nontransportation industries. The Standard Industrial Classification (SIC), which is used in the NIPA, recognizes two types of establishments—operating and support. Operating establishments offer goods and services for a fee, and support establishments provide functions such as research, central administrative services, and warehousing for other establishments of the same company. The operating establishments' SIC depends on the primary activity of the establishment; support establishments, on the other hand, are given the same SIC as the operating establishments they serve. Consequently, an operating establishment providing trucking services for a fee is classified as part of the transport industry, while a support establishment providing trucking services within a grocery firm or a manufacturing firm is considered part of the retail or manufacturing industry. Thus, value-added originating from private transportation is counted as part of the industries served.

To address this artificial distinction, BTS is engaged, jointly with BEA, in developing the Transportation Satellite Account. The TSA, developed around the U.S. Input-Output Account, will provide credible and consistent measures of transportation's contribution to the national economy and its interactive relationship with other productive sectors of the economy. It

distinguishes between for-hire and private transportation and presents information on the industry-by-industry distribution of transport activities of both types. The TSA also will facilitate analyses of interdependencies between transportation and the economy. For example, the TSA will estimate the total transportation costs embodied in each commodity delivered to final demand and assess the impact of structural changes in the economy on transportation demand.

► Transportation Services as an Intermediate Input to Industrial Production

As noted earlier, transportation services are components of both final demand and production. A larger share of transportation activities, particularly freight, however, is identified as an intermediate input⁴ in the production of goods. Table 2-5 shows intermediate and final uses of for-hire transportation services in 1987, the last year for which data are available. Nearly 59 percent of for-hire transportation was destined for intermediate consumption in 1987. Intermediate usage accounted for a high percentage of the total output of pipelines and motor freight. Fifty-six percent of railroad output was consumed as intermediate input. Water and air transport were oriented more toward final demand, with only 33 percent and 46 percent, respectively, consumed as intermediate input.

Transportation's importance as an input to production varies by industry. Table 2-6 presents the direct and indirect for-hire transportation inputs⁵ required to produce and deliver a dollar's

⁴An intermediate input is defined as goods, materials, and services used as inputs in the production of other goods or services. Intermediate inputs can be categorized as either direct or indirect (see footnote 5).

⁵Direct inputs are defined as goods, materials, and services that are used directly in the production of a product or service; e.g., steel is a direct input to the production of automobiles. Indirect inputs are defined as goods, materials, and services that are used in the production of inputs to the production of a product or service; e.g., steel is an indirect input to transportation services because it is used in the production of transportation equipment.

TABLE 2-5: INTERMEDIATE AND FINAL USES
OF FOR-HIRE TRANSPORTATION OUTPUT BY MODE, 1987
(MILLIONS OF 1987 DOLLARS)

	Intermediate use	Final use	Transport output	Intermediate use share (percent)
Railroads and services	\$27,231	\$21,164	\$48,394	56.3%
Motor freight and warehousing	80,137	35,056	115,194	69.6
Water transport	8,029	16,169	24,198	33.2
Air transport	36,314	42,745	79,060	45.9
Pipeline and other services	18,525	4,776	23,301	79.5
Total	\$170,236	\$119,910	\$290,147	58.7%

NOTE: The latest year for which data are available is 1987.

SOURCE: U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, *Benchmark Input-Output Accounts of the United States, 1987* (Washington, DC: U.S. Government Printing Office, November 1994).

worth of industrial output to final demand. Private transportation services are not included in this table.

Among the 22 industries presented in table 2-6, the transportation industry had the highest direct requirement for its own output. This reflects the fact that each transportation mode uses the services of other modes as input in providing its own services. For example, in order to provide door-to-door transportation service, a railroad may hire a trucking company to move goods from a train station to their final destinations. Moreover, all transportation modes use a significant amount of pipeline services.

Other industries also have high direct requirements for transportation. The petroleum refinery industry transports crude oil through pipelines and thus has high direct requirements for transportation services. Because of the high weight-to-value ratio of the inputs of the stone, glass, and clay products industry, transportation is a large portion of that industry's total input cost.

The mining industry's low direct requirement for transportation services is surprising. Two factors may contribute to this situation. First, natural resources, under the current NIPA, are not valued before they are brought into the pro-

duction system. Hence, minerals are valued in the NIPA only after they are extracted from the ground and have become the output of the mining industry. Therefore, a larger portion of output is counted as value-added. This, in turn, makes intermediate inputs, including transportation services, a small portion of the value of the mining industry's output. Second, inputs and outputs are valued at producer's prices in the U.S. Benchmark Input-Output Accounts. In other words, the NIPA assigns the costs of transporting inputs to the producer and assigns the costs of transporting outputs to the purchaser. Thus, the costs of transporting the mining industry's output to other industries are not counted as production costs of the mining industry. An industry's direct coefficient for transportation services is derived by dividing its transportation input by its output. Hence, high value-added industries, in general, have low direct requirements for transportation services. Processing industries that have low value-added components have high direct transportation requirements.

The table further reveals that for most of the industries examined indirect transportation requirements are larger than direct requirements. This finding underscores the importance of

TABLE 2-6: DIRECT AND INDIRECT TRANSPORTATION COSTS PER DOLLAR FINAL DEMAND

	Transportation cost per dollar of industry output (direct requirement)	Indirect transport service required per dollar of final demand	Total transport service required per dollar of final demand
Agriculture	\$0.026	\$0.036	\$0.063
Mining	0.013	0.014	0.027
Construction	0.018	0.029	0.047
Food and tobacco	0.023	0.040	0.064
Textiles	0.010	0.028	0.038
Wood products	0.027	0.032	0.059
Chemistry	0.030	0.031	0.061
Petro-refinery	0.045	0.033	0.078
Glass and stone production	0.065	0.036	0.100
Steel and metal production	0.029	0.033	0.062
General machinery	0.013	0.025	0.038
Electric machinery and equipment	0.015	0.025	0.040
Transport equipment	0.021	0.036	0.057
Precision equipment	0.010	0.021	0.031
Miscellaneous manufacturing	0.015	0.023	0.039
Transportation	0.146	1.037 ^a	1.183 ^a
Communications and utility	0.015	0.022	0.037
Wholesale and retail	0.011	0.012	0.023
Finance, insurance, real estate	0.009	0.011	0.021
Personal services	0.011	0.021	0.032
Business services	0.015	0.019	0.034
Government enterprise	\$0.039	\$0.026	\$0.065

^a Includes a dollar's worth of transport service delivered to final demand. The number is larger than one because the transportation industry uses its own output as input to produce transportation services.

NOTE: Data are in 1987 dollars and at producer's prices.

SOURCE: U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, *Benchmark Input-Output Accounts of the United States, 1987* (Washington, DC: U.S. Government Printing Office, November 1994).

including indirect impacts in analyses of the role of transportation in the economy and society.

Finally, the coefficients listed in table 2-6 may understate the requirements of industries for trans-

portation services, because they do not include private transportation services provided by non-transportation industries.

Measures of Transportation's Importance to Society: Consumer Expenditures

Consumer expenditures on transportation are important indicators of the value of transportation to society. Consumer expenditures, however, tend to understate the full social value of transportation because they do not include certain costs of transportation, such as a driver's time or compensated expenditures, such as a company-owned car.

In the United States, households spent an average of \$31,750 in 1994, an increase of 3.4 percent from 1993 (see table 2-7). Of that total, \$6,044 was spent on transportation-related services,⁶ an increase of 10.8 percent from 1993. Household expenditures on vehicle purchases and to a lesser extent on other vehicle expenses

and purchased transportation strongly affected the increase.

As a result of increased spending, transportation's share in household total expenditures rose from 17.8 percent in 1993 to 19.0 percent in 1994. In contrast, the shares of other major categories of household expenditures, such as food, clothing, health care, and insurance and pensions, decreased. Households still spent the most on housing, followed by transportation (see figure 2-3). Vehicle purchase accounted for the largest share of household transportation expenditures. On average, household expenditures on vehicles increased 18 percent between 1993 and 1994, reflecting demand for bigger, more powerful, better equipped, and more comfortable vehicles. (USDOL BLS 1993 and 1994a) See figure 2-4 and box 2-1 for information on vehicle ownership and operating costs.

In 1994, an average household spent \$381 on purchased transportation, an increase of 21 percent from 1993 (see table 2-7). In recent years, expenditures on airline tickets accounted for more than 64 percent of household spending on purchased personal transportation. (USDOL BLS 1994a) The combination of increased expenditures on air travel and relatively stable expenditures on automobile operations indicates a shift to air travel for personal intercity travel.

⁶Household expenditures do not include business travel paid for by others.

TABLE 2-7: TRANSPORTATION EXPENDITURES BY AVERAGE CONSUMER UNIT, 1993 AND 1994
(IN CURRENT DOLLARS)

Spending category	1993	1994	Change (percent)
All spending	\$30,692	\$31,750	3.4%
All transportation spending	5,453	6,044	10.8
Vehicle purchases	2,319	2,725	17.5
Gas and oil	977	986	0.9
Other vehicle expenditures	1,843	1,953	5.9
Purchased transportation services	314	381	21.4%

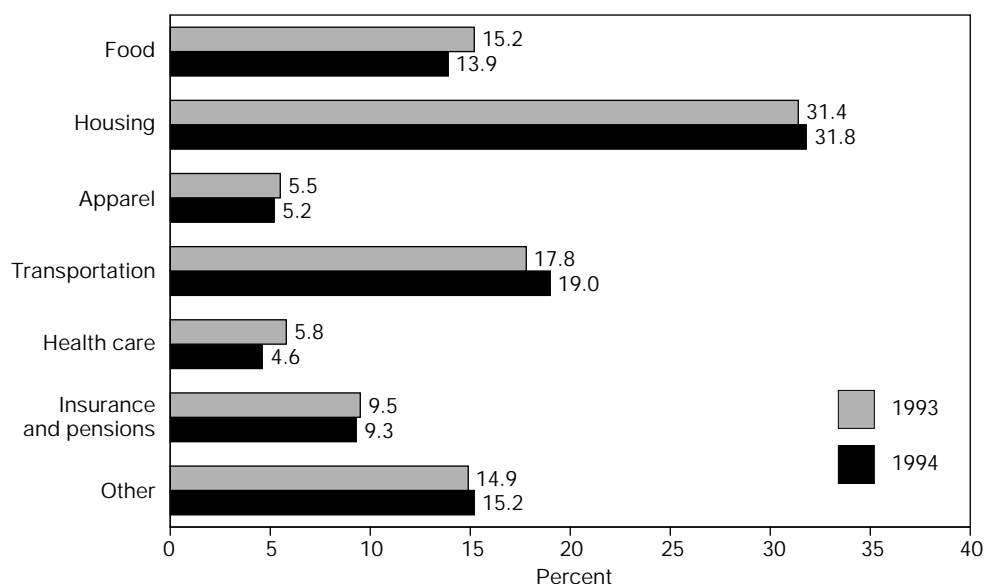
NOTE: A consumer unit comprises either one individual or members of a household who are related by blood, marriage, adoption, or other legal arrangement; a financially independent person living alone or sharing a household with others, living as a "roomer" in a private home or lodging house, or in temporary living quarters, such as a hotel or motel; two or more persons living together who use their income to make joint expenditure decisions.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1993; and unpublished data from "Consumer Expenditure Survey," 1994.

► Spending by Region

Figure 2-5 shows the regional variations in the major categories of consumer spending on transportation. The Northeast region differs significantly from other regions. Northeastern consumers spent the least on transportation, both in absolute and relative terms, arising in large part from the region's low spending on vehicle purchases. Furthermore, the Northeast region had only 1.5 vehicles per household compared with 2.1 for the Midwest, 1.8 for the South, and 2.2 for the West. The West had the highest spending on gasoline and oil and other

FIGURE 2-3: TOTAL CONSUMER EXPENDITURES BY MAJOR CATEGORY, 1993 AND 1994



SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditures Survey," 1993; and unpublished data from the "Consumer Expenditures Survey," 1994.

vehicle expenditures. Expenditures on public transport accounted for a much larger share of Northeastern consumers' total transportation spending than that in other regions. (USDOL BLS 1994a)

► Spending by Rural/Urban Location

Rural households spend on average 11 percent less than do urban households. Rural residents, however, spend more on transportation in both absolute and relative terms (see table 2-8)—about 24 percent compared with about 18 percent for urban residents.

Rural residents spend a great deal more to purchase vehicles and fuel, but less for other vehicle-related costs such as insurance and repairs. Urban dwellers spend more for vehicle leasing, which is included under "Other vehicle expenditures" in table 2-8. The greatest dispari-

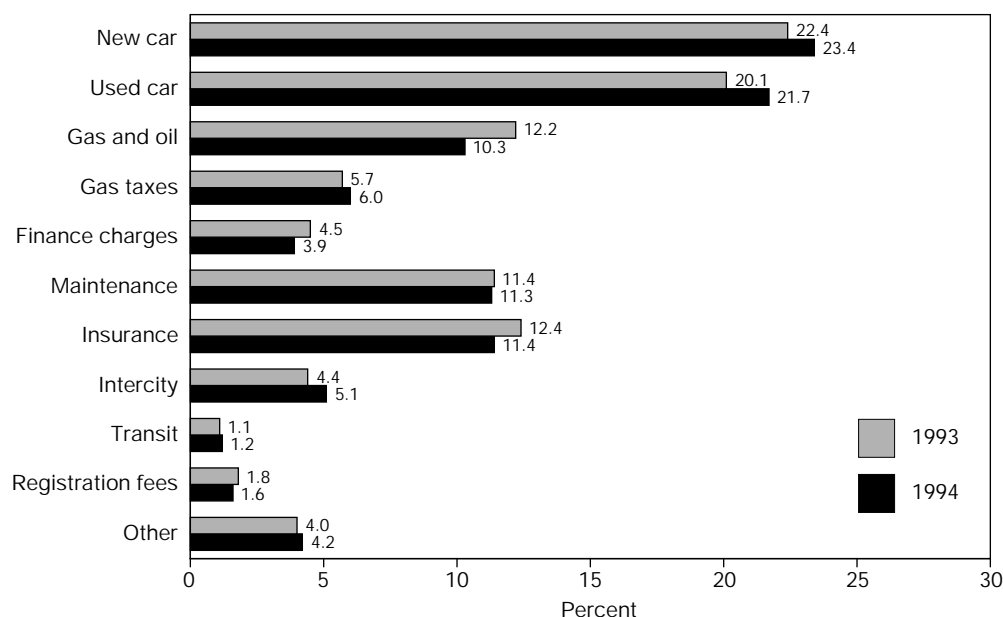
ty between urban and rural areas is in purchased transportation services, such as taxis. Urban dwellers spend twice as much as rural residents for this service.

► Spending by Race

The Consumer Expenditure Survey (CES)⁷ delineates black consumer spending from other population groups, but cannot provide detailed racial and ethnic spending information because of sample size limitations. Table 2-9 shows 1994 spending patterns of black and white or other consumers. Black consumers spend less overall on transportation. The greatest differences

⁷The Consumer Expenditure Survey is a major source of information on U.S. consumer buying habits. This information, which is collected by the Bureau of Census for the Bureau of Labor Statistics, is an important component of the Consumer Price Index. About 95 percent of consumer expenditures are covered by the Survey. It excludes nonprescription drugs, household supplies, and personal care items. Also excluded from the Survey are all business-related expenses for which a family is reimbursed.

FIGURE 2-4: DETAILED CONSUMER EXPENDITURES ON TRANSPORTATION, 1993 AND 1994



SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditures Survey," 1993; and unpublished data from the "Consumer Expenditures Survey," 1994.

between the two groups are found in the vehicle purchases and other vehicles expenditures categories. Black consumers spend a greater share on vehicle purchases while white consumers spend more for other vehicle expenses. These differences are, in part, a product of substituting vehicle leasing for vehicle purchases among white households.

The area of significant variation in spending is in the category of purchased transportation services. Black and white consumers spend about 1 percent of total expenditures on purchased transportation. Black consumers, however, spend twice as much on taxis as do white consumers. Also, black consumer spending on public transit is more than three times that of white consumers. White consumers spend substantially more than blacks for all categories of intercity travel—about three times more for air and rail travel.

► Spending Away from Home

Consumer expenditures on travel while away from home are difficult to ascertain. The CES sheds valuable light on that segment of travel, but several expenses are not included, such as any travel paid for or reimbursed by employers and institutions. Certain expenditures, such as taxicabs, can be easily identified as to whether the service was bought at home or on travel. Other spending, however, such as vehicle purchases or repairs, are more difficult to assign. An allocation based on miles traveled or another method would have to be developed in order to determine the split between expenses incurred at home and those incurred while traveling.

Identifiable expenditures reported by the CES are shown in table 2-10. According to the table, out-of-town consumer spending added up to an average of about \$450 per household in

Box 2-1: VEHICLE OWNERSHIP AND OPERATING COSTS

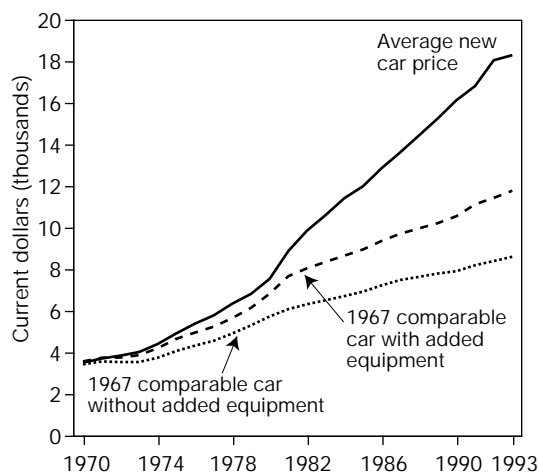
Vehicle purchases account for a large percentage of household transportation budgets. According to the Consumer Price Index, new car costs have risen less rapidly than general costs since 1970, and far less rapidly than used car costs. This may seem counterintuitive, but the reason is that the average new car of the 1990s is very different from the average new car of the 1970s, as explained below.

New Car Costs

The average price of a new car, in current dollars, rose from about \$3,500 in 1970 to almost \$20,000 in 1994.¹ In 1990 dollars, correcting for inflation, new car prices hovered around \$12,000 throughout the 1970s, then rose to about \$16,900 by 1995.

¹ American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures* (Washington, DC: 1995), p. 60.

FIGURE 1: TRENDS IN THE COST OF AUTOMOBILES, 1970-93



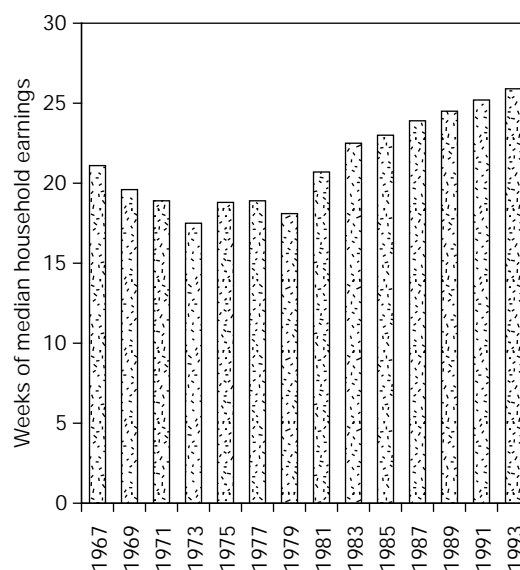
NOTES: 1967 comparable = basic car as of 1967.
1967 with added equipment = basic 1967 car with costs for mandated federal safety and emissions equipment.
Average new car price = basic car with mandated equipment, plus amenities and improvements added.

SOURCE: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures* (Washington, DC: 1989 and 1994).

Figure 1 breaks down the trend in vehicle prices into three components of vehicle costs. The bottom curve tracks the price of a basic vehicle, comparable in design and equipment to a 1967 model vehicle. The middle curve shows the impact on price of added equipment and modifications required by federal and state mandated safety and emissions regulations. These requirements increased vehicle price to about \$11,800. The top curve adds the price increase attributable to improvements and amenities demanded by consumers, including air conditioning, power assists, and stereo equipment. Today, these options are standard on most new vehicles.

In 1993, a family earning the median national income needed about 26 weeks of salary to purchase a new car compared with less than 20 weeks in the 1970s (see figure 2). *(continued)*

FIGURE 2: WEEKS OF HOUSEHOLD EARNINGS REQUIRED TO PURCHASE AN AVERAGE-PRICED NEW CAR



SOURCE: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures 94* (Washington, DC: 1994).

BOX 2-1 (CONT'D): VEHICLE OWNERSHIP AND OPERATING COSTS

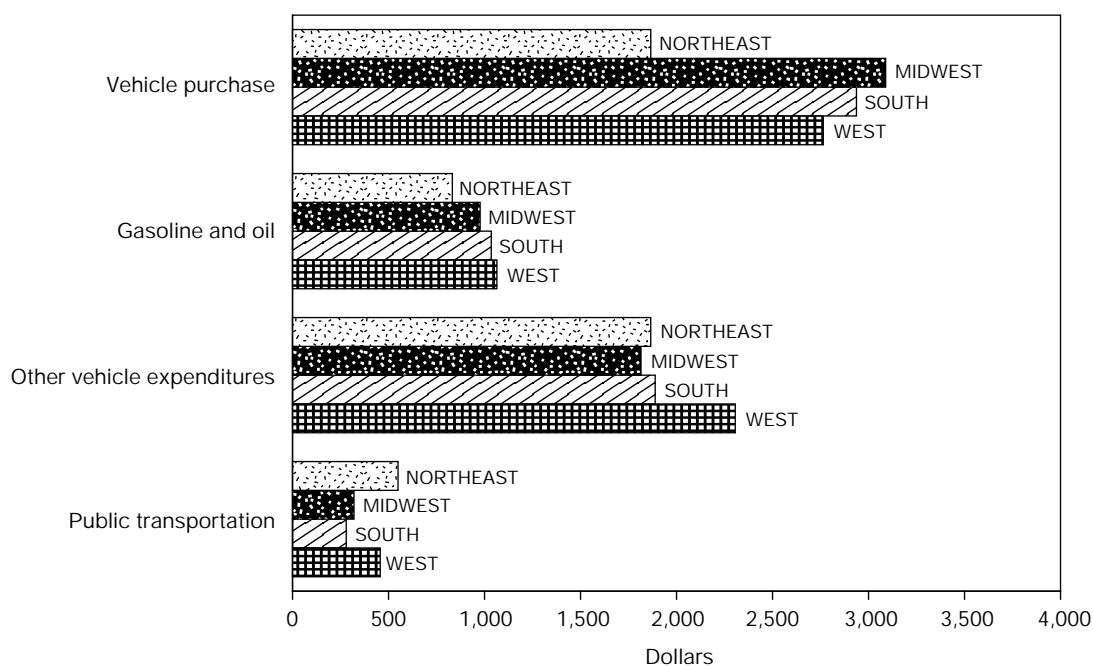
Vehicle Operating Costs

Vehicle operating costs vary per mile of travel and the price of fuel. Since the early 1980s, the price of unleaded regular fuel has declined substantially, both in current and constant dollars. Fuel efficiency improvements also have an impact on vehicle operating costs by reducing fuel costs per mile of travel. Of course, fuel costs vary by region.

Generally, the more miles a vehicle travels in a year, the more the cost per mile decreases. It is estimated that the annual cost of operating a vehicle in 1995 ranged from 50.6 cents per mile, if 10,000 miles were traveled, to 37.0 cents, if 20,000 miles were traveled.²

² Based on American Automobile Association data.

FIGURE 2-5: AVERAGE CONSUMER UNIT TRANSPORTATION EXPENDITURES BY REGION, 1994



SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1994.

1994 or about 7 percent of total transportation expenditures. This figure does not include other costs of travel away from home, such as lodging and food. Also, it is important to remember that these expenditures are averages for all households and that only a few households incur these out-of-town travel expenses in any given year.

Foreign visitors also expend substantial funds in the United States, a large part of which is for transportation. Foreign visitors arriving by air in the United States spent, on average per person, \$3,222 in 1994: \$1,654 was spent on international air travel and \$1,568 on all expenses incurred in the United States. About \$200 per

TABLE 2-8: HOUSEHOLD TRANSPORTATION EXPENDITURES IN URBAN AND RURAL AREAS, 1994

Expenditure category	Urban	Rural	Urban (percent)	Rural (percent)	Rural/Urban (ratio)
All expenditures	\$32,247	\$28,724	100.0%	100.0%	0.89
All transportation expenditures	5,919	6,807	18.4	23.7	1.15
Vehicle purchases	2,581	3,601	8.0	12.5	1.40
Gas and oil	946	1,232	2.9	4.3	1.30
Other vehicle expenditures	1,982	1,771	6.2	6.2	0.89
Purchased transportation services	410	202	1.3	0.7	0.49

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1994.

TABLE 2-9: COMPARISON OF HOUSEHOLD TRANSPORTATION SPENDING BY RACE, 1994

	White and other	Black	White and other (share in percent)	Black (share in percent)	Black/white (ratio)
All expenditures	\$32,935	\$22,418	100.0%	100.0%	0.68
All transportation expenditures	6,268	4,271	19.0	19.0	0.68
Vehicle purchases	2,814	2,014	8.5	9.0	0.72
Gas and oil	1,020	713	3.1	3.2	0.70
Other vehicle expenditures	2,037	1,283	6.2	5.7	0.63
Purchased transportation services	396	261	1.2	1.2	0.66

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1994.

traveler was spent on transportation within the United States, including car rentals, air, bus and rail fares, taxis, and mass transit. In 1994, foreign visitors arriving by air accounted for almost \$4 billion of the revenues of U.S. transportation firms. (USDOT USTTA 1995) Expenditures of visitors who arrived by land and sea are not included in these totals. The use of transportation modes by foreign visitors who arrive by air is shown in figure 2-6.

Transportation Expenditures and Revenues: The Public Sector

Federal, state, and local governments are important providers and purchasers of transportation infrastructure, equipment, and services. Governments finance these activities through general tax revenues, special user taxes, and user fees. State and local governments also rely on grants from the federal government. This section describes trends in government expenditures and revenues.

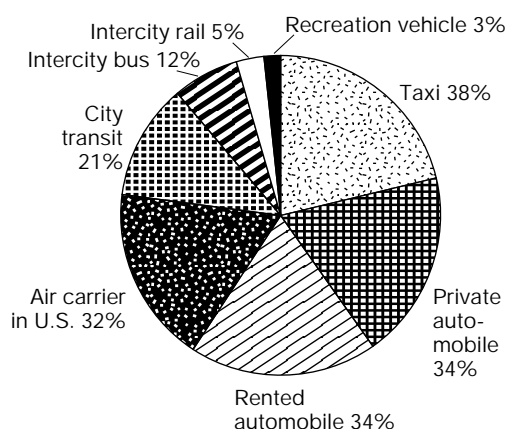
TABLE 2-10: OUT-OF-TOWN HOUSEHOLD EXPENDITURES, 1994

Expenditure category	Average expenditure	As a portion of all household purchases in category
Gasoline	\$86.21	Roughly 10%
Motor oil	0.87	Roughly 8%
Auto rental	24.44	Roughly 4 times local auto rental
Truck rental	4.32	Roughly 3 times local truck rental
Aircraft rental	1.01	
Parking	3.10	Roughly 14% of nonresidential parking
Tolls	4.63	Roughly the same amount as local tolls
Airline fares	249.48	
Intercity bus fares	11.34	
Public transit	10.35	Roughly 18%
Taxi fares	6.08	Roughly 45%
Intercity train fares	16.24	
Ship fares	31.13	Mostly cruise ships
Total	\$449.20	

NOTE: Reimbursed travel is not included.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1994.

FIGURE 2-6: USE OF TRANSPORT MODES BY FOREIGN VISITORS TO THE UNITED STATES, 1994



NOTE: Multiple responses are included. Respondents limited to those departing by air.

SOURCE: U.S. Department of Commerce, U.S. Travel and Tourism Administration, "In-Flight Survey of International Air Travelers," 1995.

► Government Expenditures

Federal, state, and local governments spent \$113.3 billion on transportation in fiscal year 1992, or 4.6 percent of total government expenditures (see table 2-11). Transportation expenditures by all levels of government increased by 31 percent in real terms between 1982 and 1992. The federal government spent \$34.8 billion, transferring \$21.4 billion or just over 60 percent to state and local governments. In addition to the \$21.4 billion in federal grants, state and local governments spent \$78.5 billion of their own funds on transportation. It is important to note that federal and state and local government transportation expenditures shown in table 2-11 do not correspond to transportation-related government purchases reflected in table 2-1. There are two main reasons. First, government transportation expenditures shown in table 2-11 include subsidies paid to operators of private systems. These subsidies are not counted as transportation-related govern-

TABLE 2-11: GOVERNMENT TRANSPORTATION EXPENDITURES
(MILLIONS OF DOLLARS)

	Current dollars		Change (percent)	Constant 1982 dollars		Change (percent)
	1982	1992		1982	1992	
Federal: excluding grants to state and local government	\$9,786	\$13,388	36.8%	\$9,786	\$9,693	-1.0%
Federal grants to state and local government	13,844	21,365	54.3	13,844	15,469	11.7
State and local spending excluding federal grants	36,766	78,544	113.6	36,766	53,744	46.2
Total government expenditures	\$60,396	\$113,297	87.6	\$60,396	\$78,906	30.7

NOTE: Different deflators for different levels of government are used: 1982 = 100; all government, 1992 = 142.5; state and local government, 1992 = 146.1; federal government, 1992 = 138.1. As a result, totals in tables 2-11, 2-12, and 2-13 will not agree.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State and Local Transportation Financial Statistics—Fiscal Years 1982–1992*, DOT-VNTSC-BTS-95-2 (Washington, DC: 1995), table 3, p. 17.

ment purchases in GDP calculations. Second, and to a lesser extent, GDP calculations for highway expenditures by state and local government are derived from the *Census of Governments* and the *Annual Survey of State and Local Government Finances*, which are both publications of the Bureau of the Census. The highway expenditures reported by the Bureau of the Census are generally slightly lower than those reported in table 2-11, which provide a more complete accounting of highway-related expenditures. For example, the data include highway law enforcement and highway safety costs as well as interest on debt and debt retirement. These costs are not included in the *Census of Government's* highway expenditures but are included under Civilian Safety and Interest Paid categories.

In relative terms, the federal role in financing transportation diminished in recent years, but in absolute terms, the federal transportation budget increased (see box 2-2). Although federal spending, including grants to state and local governments increased by 6.5 percent (in constant dollars) between 1982 and 1992, spending by state and local governments, excluding federal grants, increased by 46 percent. As a result, the federal portion of government transportation spending declined from 39 percent in 1982 to 32 percent in 1992. (USDOT BTS 1995a)

Transportation is a more important part of state and local government budgets than of the budget of the federal government. In 1992, before intergovernmental transfers, transportation was 2.3 percent of total federal government expenditures, but 8.1 percent of state and local spending. (USDOT BTS 1995a, 12, 17)

Most government transportation funds were spent on highways (59.5 percent) in 1992, approximately the same proportion spent in 1982 (see table 2-12). A large proportion of the rest goes to transit, air transportation, and water transportation. Very small shares go to rail and pipelines. Starting from a small base, spending on pipelines grew the most, 167 percent from 1982 to 1992 in real terms. Spending on air transportation also increased substantially over this period. Spending on transit and highways also grew, but less rapidly, while spending on rail and water transportation decreased.

As shown in table 2-13, state and local governments spend proportionately more of their money on highways and transit than the federal government. By contrast, the federal government spends proportionately more on air and water transportation.

Table 2-13 also shows how government spending priorities shifted within transportation between 1982 and 1992. The proportion of

BOX 2-2: U.S. DEPARTMENT OF TRANSPORTATION 1994 BUDGET

The U.S. Department of Transportation (DOT) outlays increased by 13 percent in real terms between 1984 and 1994, to a total of \$34.8 billion in current dollars. The Federal Highway Administration accounts for the largest share of DOT outlays, spending 55 percent of the budget in 1994 compared with 48 percent in 1984. The other large administrations are the Federal Aviation Administration (FAA), which received 25 percent of outlays, and the Federal Transit Administration (FTA), at 11 percent. FAA outlays increased by 67 percent, and U.S. Coast Guard outlays increased by 23 percent in real terms between 1984 and 1994. The outlays of FTA, the Maritime Administration, and the National Highway Traffic Safety Administration, however, decreased in real terms over this period. Federal Railroad Administration outlays fell the most—76 percent in real terms between 1984 and 1994 (see table).

SOURCE: Volpe National Transportation Systems Center data.

DEPARTMENT OF TRANSPORTATION OUTLAYS, 1984 AND 1994
(IN MILLIONS OF CONSTANT 1987 DOLLARS)

Modal Administration	1984	1984 (percent)	1994	1994 (percent)	Percentage change
Federal Highway Administration	\$11,255	47.7%	\$14,712	55.2%	30.7%
Federal Aviation Administration	4,067	17.2	6,783	25.4	66.8
Federal Transit Administration	4,024	17.0	2,926	11.0	-27.3
Federal Railroad Administration	2,665	11.3	643	2.4	-75.9
U.S. Coast Guard	749	3.2	920	3.5	22.8
Maritime Administration	540	2.3	393	1.5	-27.2
National Highway Traffic Safety Administration	211	0.9	201	0.8	-4.7
All other DOT organizations	109	0.5	81	0.3	-25.7
Total	\$23,620	100.0%	\$26,659	100.0%	12.9%

SOURCES: 1984—U.S. Department of Transportation, Office of Economics, Assistant Secretary for Policy and International Affairs, *Federal Transportation Financial Statistics* (Washington, DC: various years). 1994—U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal Transportation Financial Statistics*, prepared by Volpe National Transportation Systems Center (Washington, DC: in press).

federal funds spent on transit, rail, and water transportation decreased while air transportation's proportion of federal funding increased over this period. Highway spending increased slightly.

State and local government spending priorities changed less and in a different way. Most notably state and local governments spent a slightly smaller proportion of funds on highways in 1992 than in 1982 and a slightly greater proportion on transit.

► Government Revenues

Revenues collected by government for transportation purposes fall into three categories:

- general tax receipts including income, property, and sales taxes;
- special user taxes, such as the airport tax and gas tax, placed in trust funds separate from general tax receipts; and
- user fees, such as road and bridge tolls.

TABLE 2-12: TRANSPORTATION EXPENDITURES BY ALL LEVELS OF GOVERNMENT, 1982 AND 1992 (MILLIONS OF CONSTANT 1982 DOLLARS)

Mode	1982		1992		Change (percent)
Highway	\$35,731	59.2%	\$47,310	59.5%	32.4%
Transit	11,401	18.9	15,684	19.7	37.6
Air	6,043	10.0	11,055	13.9	82.9
Water	4,412	7.3	3,967	5.0	-10.1
Rail	2,250	3.7	635	0.8	-71.8
Parking	395	0.7	630	0.8	59.5
Unallocated	155	0.3	203	0.3	31.0
Pipeline	9	0.01	24	0.03	166.7
Total	\$60,396	100.0%	\$79,508	100.0%	31.6%

NOTE: Different deflators for different levels of government are used: 1982 = 100; all government, 1992 = 142.5; state and local government, 1992 = 146.1; federal government, 1992 = 138.1. As a result, totals in tables 2-11, 2-12, and 2-13 will not agree.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State and Local Financial Statistics—Fiscal Years 1982–1992*, DOT-VNTSC-BTS-94-2 (Washington, DC: 1995).

Transportation-generated revenues totaled \$80.2 billion in 1992 (in current dollars), a 55 percent increase in real terms since 1982. Revenues grew more rapidly than expenditures; hence, coverage (the proportion of expenditures covered by user taxes and fees) grew from 60 percent in 1982 to 71 percent in 1992. (USDOT BTS 1995a, 17)

State governments collected the largest amount of revenue—48 percent of the total in 1992. The federal government collected about 33 percent and local governments, almost 19 percent. The proportion of transportation-related revenues collected by the federal government increased from about 28 percent in 1982. This is due, in part, to high federal revenue growth rates over this period. Both state and local revenues grew as well, but their proportion of total revenue decreased. (USDOT BTS 1995a, 17)

Several taxes and user fees collected by the federal government are placed in trust funds dedicated to a specific mode. There are four

TABLE 2-13: TRANSPORTATION EXPENDITURES BY LEVEL OF GOVERNMENT BEFORE TRANSFERS (MILLIONS OF CONSTANT 1982 DOLLARS)

Mode	1982		1992	
Federal				
Highway	\$10,740	45.5%	\$12,144	48.3%
Air	3,564	15.1	6,743	26.8
Transit	3,954	16.7	2,661	10.6
Water	2,991	12.7	2,745	10.9
Rail	2,225	9.4	652	2.6
Pipeline	2	0.01	9	0.04
Unallocated	155	0.7	209	0.8
Total	\$23,630	100.0%	\$25,162	100.0%
State and local				
Highway	\$24,991	68.0%	\$34,654	64.5%
Air	2,479	6.7	4,407	8.2
Transit	7,447	20.3	12,778	23.8
Water	1,422	3.9	1,273	2.4
Rail	25	0.07	3	0.01
Parking	395	1.1	615	1.14
Pipeline	7	0.02	13	0.02
Total	\$36,766	100.0%	\$53,744	100.0%

NOTE: Different deflators for different levels of government are used: 1982 = 100; all government, 1992 = 142.5; state and local government, 1992 = 146.1; federal government, 1992 = 138.1. As a result, totals in tables 2-11, 2-12, and 2-13 will not agree.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State and Local Financial Statistics—Fiscal Years 1982–1992*, DOT-VNTSC-BTS-95-2 (Washington, DC: 1995).

federal transportation-related trust funds: the Highway Trust Fund, the Airport and Airway Trust Fund, the Inland Waterway Trust Fund, and the Harbor Maintenance Trust Fund. Revenue is also generated by the Panama Canal, the Pipeline Safety Fund, the Oil Spill Liability Trust Fund, and the Emergency Preparedness Fund. The two main federal transportation trust funds are the Highway Trust Fund—which has a highway account and, since 1983, a transit account—and the Airport and Airway Trust Fund.

The total collections from all these revenue-generating mechanisms rose from \$10.0 billion in 1982 to \$18.7 billion in 1992 (in 1982 dollars). In 1992, the bulk of federal transportation revenues (71.3 percent) came from the federal Highway Trust Fund, which is generated mostly by a tax on highway vehicle fuels (see table 2-14) but also includes taxes on tires and truck, bus, and trailer sales. Highway trust revenue increased by 70 percent in real terms since 1982. The Airport and Airway Trust Fund and federal water receipts both increased more rapidly. The pipeline safety fund, instituted in 1987, now represents 0.05 percent, or \$10 million of federal revenue (in 1982 dollars).

Federal Trust Fund Revenue and Balances

From the standpoint of changes in federal receipts, particularly the large federal trust funds, the period from 1982 to 1992 does not provide a very accurate picture because of a large dip in revenues in the early 1980s. Thus, a longer view of trust fund revenue balances is necessary. From 1977 to 1994, the tax revenue collected for the Highway Trust Fund and the Airport and Airway Trust Fund increased from \$14.1 billion to \$16.9 billion (in constant 1987 dollars), a 20 percent increase. Revenue fell sharply in the early 1980s to a low of \$7.8 billion in 1981, but

recovered by 1984. The trust fund dedicated to aviation increased the most in absolute terms over this period, almost doubling from \$2.1 billion in 1977 to \$4 billion in 1994, in constant 1987 dollars. The transit account of the Highway Trust Fund, started in 1983, collected \$1.6 billion in 1994. The largest trust fund in terms of revenue, the highway account of the Highway Trust Fund, however, declined slightly from \$11.9 to \$11.3 billion in constant 1987 dollars. In current dollars, trust fund revenues increased from \$7.9 billion in 1977 to \$21.9 billion in 1994 (see figures 2-7 and 2-8).

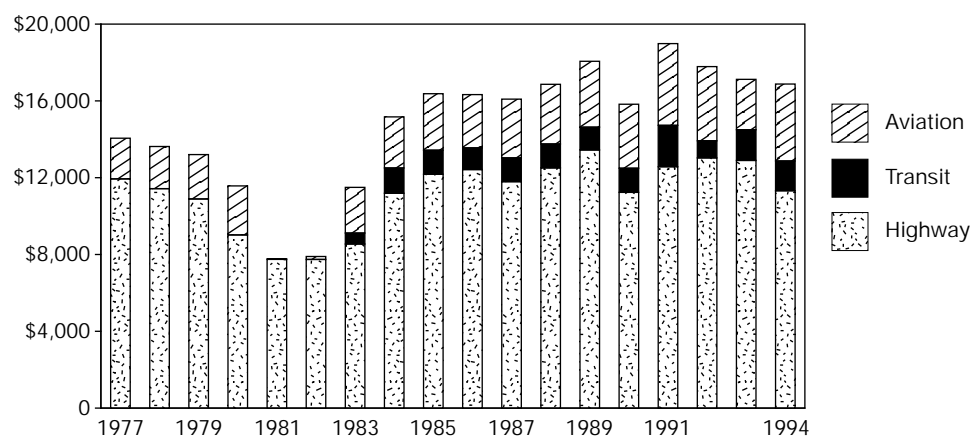
The trust fund balances—the unspent money in these accounts at the end of the year—declined in the late 1970s, grew substantially from the mid-1980s to the early 1990s, but have since declined to approximately the same level (in real terms) in 1994 as in 1977. In constant 1987 dollars, from 1977 to 1994 the total cash balance in the Highway Trust Fund and the Airport and Airway Trust Fund declined by 5 percent from \$24.6 billion in 1977 to \$23.4 billion in 1994. The balances in the various funds fluctuated in different ways. The balance in the Airport and Airway Trust Funds grew by 65 percent from \$5.8 billion in 1977 to \$9.6 billion in 1994 (in constant 1987 dollars). By contrast, the balance in the highway account of the Highway Trust

TABLE 2-14: FEDERAL REVENUE
(IN MILLIONS OF CONSTANT 1982 DOLLARS)

Mode	1982		1992		Percentage Change
Federal Highway Trust Fund, Highway Account	\$7,822	78.2%	\$11,999	64.3%	53.4%
Federal Highway Trust Fund, Transit Account	n/a	n/a	\$ 1,315	7.0%	n/a
Federal Airport and Airway Trust Fund	\$1,711	17.1%	\$ 4,285	22.9%	150%
Total federal water receipts	\$474	4.7%	\$ 1,067	5.7%	125%
Pipeline Safety Fund	n/a	n/a	\$ 10	0.05%	n/a
Total	\$10,008	100.0%	\$18,676	100.0%	86.6%

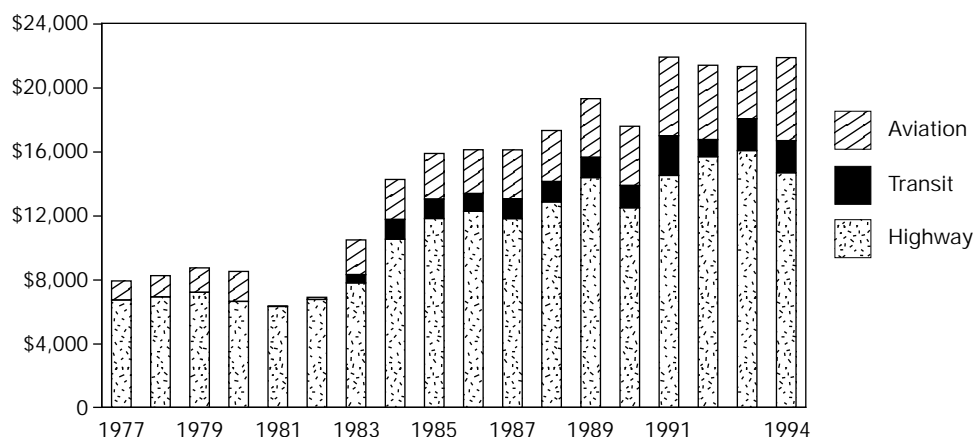
SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *Federal, State and Local Financial Statistics—Fiscal Years 1982–1992*, DOT-VNTSC-BTS-95-2 (Washington, DC: 1995).

FIGURE 2-7: TRANSPORTATION TRUST FUND REVENUES, 1977-94
(MILLIONS OF CONSTANT 1987 DOLLARS)



SOURCE: Based on data from the Volpe National Transportation Systems Center.

FIGURE 2-8: TRANSPORTATION TRUST FUND REVENUES, 1977-94
(MILLIONS OF CURRENT DOLLARS)



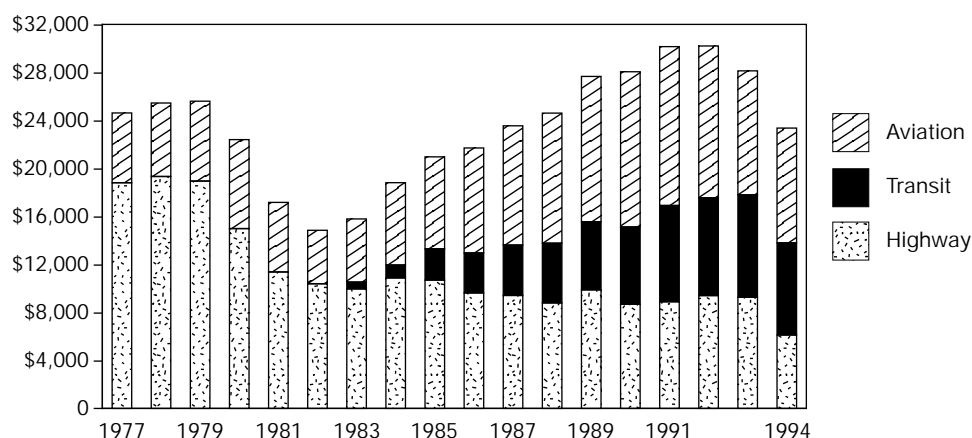
SOURCE: Based on data from the Volpe National Transportation Systems Center.

Fund declined by 68 percent from \$18.9 billion to \$6.1 billion over this period. The transit account balance stood at \$7.7 billion in 1994 (in 1987 dollars) (see figure 2-9). In current dollars the total balance in the two trust funds rose from \$13.4 billion in 1977 to \$30.4 billion in 1994 (see figure 2-10).

Employment

Transportation employment can be analyzed from either an industry or occupation perspective. For example, transportation occupations include vehicle operators in any industry. From an industry perspective, vehicle operators are

FIGURE 2-9: TRANSPORTATION TRUST FUNDS—END OF YEAR CASH BALANCES, 1977–94
(MILLIONS OF CONSTANT 1987 DOLLARS)



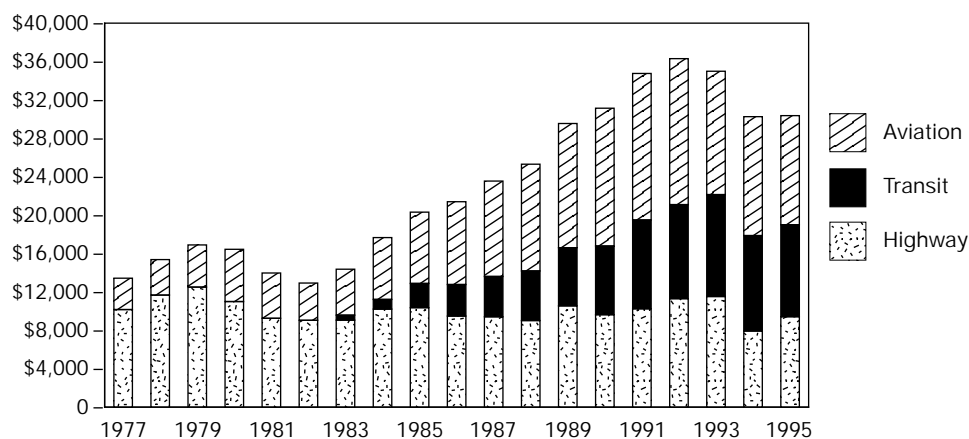
SOURCE: Based on data from the Volpe National Transportation Systems Center.

classified under the industry in which they work. Similarly, an accountant in a trucking firm is an accountant by occupation but is a transportation employee from an industrial viewpoint. Few statistical sources provide data that permit detailed delineation of transportation employment within

nontransportation establishments. (USDOT FHWA 1995)

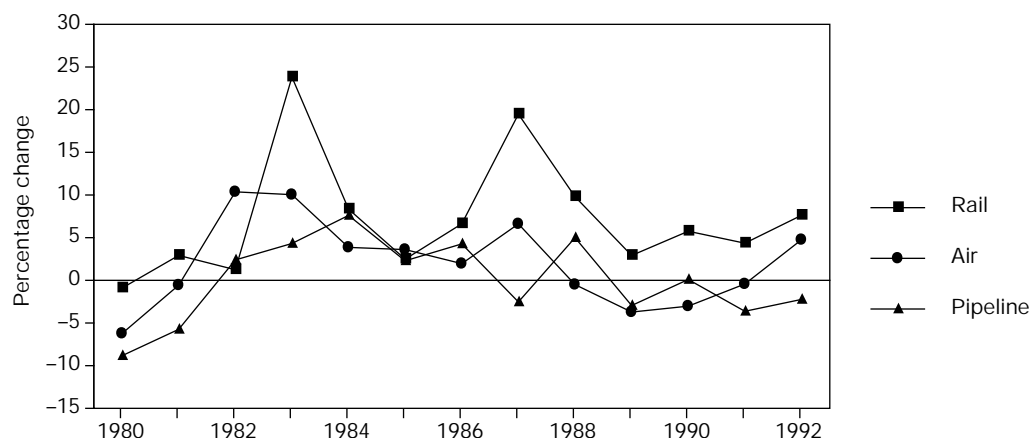
In 1993, more than 3.2 million people were employed in for-hire transportation industries, an increase of 4.4 percent from 1992. The figure of 3.2 million people excludes 2 million employees

FIGURE 2-10: TRANSPORTATION TRUST FUNDS—END OF YEAR CASH BALANCES, 1977–95
(MILLIONS OF CURRENT DOLLARS)



SOURCE: Based on data from the Volpe National Transportation Systems Center.

FIGURE 2-11: ANNUAL GROWTH OF TRANSPORTATION PRODUCTIVITY, 1980-92



SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *Productivity Measures for Selected Industries and Government Services* (Washington, DC: In press).

of 200,000 retail establishments, such as car dealerships and gas stations, and 900,000 people employed by 175,000 service businesses, such as car washes, body shops, and repair facilities. Also excluded are all government and manufacturing employees with transportation jobs. (USDOC Bureau of the Census 1993) The *National Transportation Statistics 1996* report provides detailed information on transportation employment for 1994 and earlier. According to the report, when all related activities are included, more than 9 million people were employed in transportation activities in 1994. (USDOT BTS 1995b)

Establishments with one to four employees constitute 55 percent of total transportation businesses. Conversely, 21 percent of total transport employees work in establishments with more than 1,000 workers. These large businesses constitute less than one-tenth of 1 percent of establishments.

Establishment size varies by mode as well. The airline industry, for example, consists of a few large establishments with more than 1,000 employees. These few large businesses account for half of all airline employees.

► Costs and Productivity Trends

Table 2-15 shows growth in labor costs in the transportation industry relative to all workers and to similar labor groups such as communications and utilities workers. Transportation labor costs have risen less than for these groups.

Transportation Statistics Annual Report 1995 extensively discussed productivity patterns in the transportation sector. Figure 2-11 presents the most current productivity data.

TABLE 2-15: EMPLOYMENT COST INDEX

Worker category	Index (June 1993)
All civilian workers	118.3
Private industry	118.0
All services	117.3
Transportation	114.1
Communications	117.5
Utilities	119.4

NOTE: June 1989 = 100.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, September 1994, table 21.

The airline industry is using fewer employees to provide service to a growing number of passengers. The striking increase in productivity arises, in part, from larger and faster aircraft, the computerization of passenger reservations, the hub and spoke flight network, and changes in flight personnel requirements. Various new management techniques adopted by airlines after deregulation may also have increased productivity. Over the same period, operating revenues per employee significantly increased.

Expenditures and Revenues of the Trucking and Railroad Industries

This section discusses the financial performance of for-hire transportation service providers and presents revenue and expenditure trends for the trucking and railroad industries. (See appendix A for an indepth review of the U.S. commercial aviation industry.)

► Trucking Industry

As noted earlier, no single source provides comprehensive economic and financial data for all transportation service providers. However, there are specialized data sources that provide information on specific industries. A major source of disaggregated data on trucking operating revenues and expenditures is the Annual Survey of Motor Freight Transportation and Public Warehousing, also known as the Warehousing and Trucking Survey (WATS). Since 1988, the Bureau of the Census has compiled WATS data. Although this survey is one of the more comprehensive data sources for the trucking industry, it has several limitations. First, the survey covers only for-hire trucking firms. Activities of private trucking auxiliaries of nontransportation

establishments, or shipper-owned trucking operations, are estimated to be at about the same level as for-hire trucking. (As noted earlier, the Transportation Satellite Account will more accurately reflect the transportation activities of nontransportation establishments.) Second, only revenues and expenditures of for-hire establishments with payrolls are provided. This excludes the thousands of truck owners-operators, sole proprietorships, and partnerships that technically have no employees, but account for a substantial proportion of industry activity (about 50 percent). Currently, BTS and the Bureau of Economic Analysis are investigating alternative methods to address these limitations.

The trucking industry cost structure is a combination of relatively high variable expenses and low fixed costs. Public investment in the extensive U.S. highways system is a major factor that contributes to the industry's low fixed costs. Other factors are fixed depreciation and interest expenses and low management overhead. A high proportion of trucking industry expenditures is related to variable operating expenses—wages and benefits, fuel, and maintenance and repairs. Purchased transportation is another high-cost item for the industry.

Table 2-16 shows detailed expenses of the trucking industry between 1988 and 1993. Both labor and fuel costs have increased their shares of total expenditures. Wages and benefits accounted for 41.2 percent of total expenditures in 1993, a slight increase from 39.5 percent in 1988 (see figure 2-12). Over the same period, trucking industry spending on purchased fuel increased by 60 percent, from \$6.7 billion to \$10.8 billion, and fuel costs as a proportion of total costs rose from 6.6 percent to 8.4 percent.

Although spending on purchased transportation also increased (by 17 percent), its share of total costs declined from 20.2 percent in 1988 to 18.7 percent in 1993. This decline suggests

TABLE 2-16: EXPENDITURES OF FOR-HIRE TRUCKING AND PUBLIC WAREHOUSING, 1988-93
(MILLIONS OF CURRENT DOLLARS)

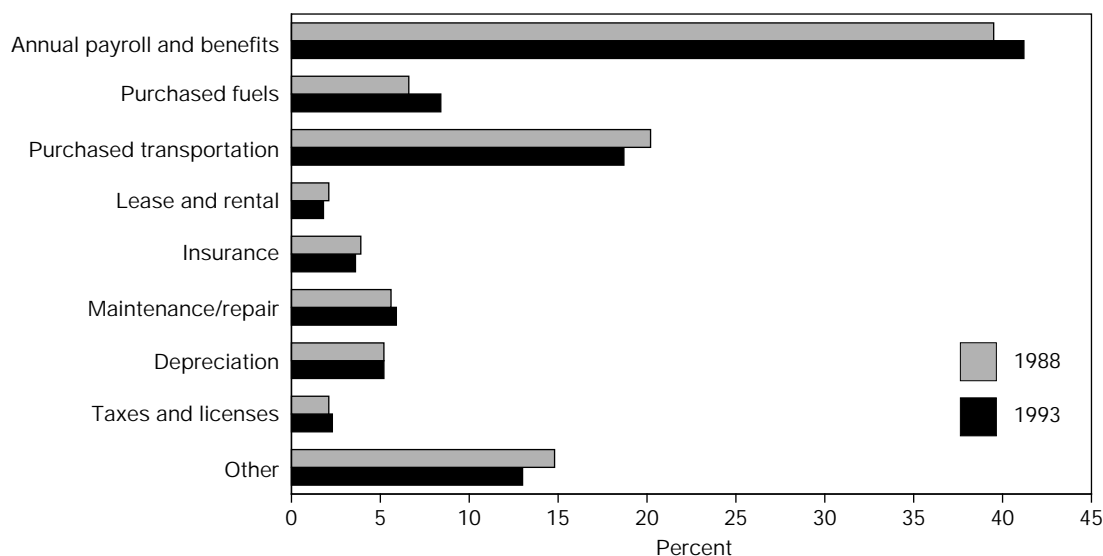
Cost items/year	1988	1989	1990	1991	1992	1993	Percentage change 1988-93
Annual payroll/benefits	\$40,097	\$43,598	\$46,257	\$47,303	\$49,876	\$52,747	32%
Purchased fuels ^a	6,739	7,753	9,011	9,080	10,078	10,754	60
Purchased transportation	20,446	19,896	20,505	20,191	22,187	23,880	17
Lease and rental ^b	2,098	2,102	2,238	2,231	2,246	2,264	8
Insurance	3,914	3,996	4,040	4,141	4,283	4,547	16
Maintenance of vehicles	5,669	6,055	6,358	6,357	7,091	7,586	34
Depreciation	5,289	5,622	5,829	5,856	6,199	6,594	25
Taxes and licenses	2,178	2,347	2,416	2,534	2,865	2,988	37
Other	15,011	15,093	15,951	15,044	16,068	16,586	10
Total	\$101,441	\$106,462	\$112,605	\$112,737	\$120,890	\$127,946	26%

^a Includes vehicle fuels and heating fuels for buildings.

^b Nonvehicular leases and rentals.

SOURCE: U.S. Department of Commerce, Bureau of the Census, *Motor Freight Transportation and Warehousing Survey: 1993* (Washington, DC: 1995).

**FIGURE 2-12: FOR-HIRE TRUCKING INDUSTRY
OPERATING EXPENDITURES BY COST ITEMS, 1988 AND 1993**



SOURCE: U.S. Department of Commerce, Bureau of the Census, Economics and Statistics Administration, *Motor Freight Transportation and Warehousing Survey: 1993* (Washington, DC: 1995).

that businesses that once depended on out-sourced trucking services shifted to private in-house sources.

Purchased transportation by trucking establishments is normally categorized into three groups: vehicle leasing without drivers; vehicle leasing with drivers; and directly purchased transportation from air, rail, water, or other motor carriers (see table 2-17). Of these categories, leasing without drivers grew the most rapidly, increasing more than 41 percent from 1988 to 1993, compared with an overall increase of 17 percent for purchased transportation. The category of vehicle leasing with drivers provides an insight into the scale of owner-operator (nonpayroll) activities. This category accounted for almost 67 percent (\$16 billion) of purchased transportation by truckers in 1993. Data on the third category—directly purchased transport—suggests an increasing level of intermodal activity in the trucking industry. Although this category remains below \$3.5 billion per year in expenditures, it grew 34 percent between 1988 and 1993. Almost 85 percent of purchased transportation from other transport modes is bought by general carriers (carriers not classified as specialized to transport goods such as household items, farm and forest products, electronics, and hazardous and toxic materials). Unfortunately, data are not provided for rail, water, or other motor carrier transport.

► Railroad Industry

The railroad industry plays a vital role in the U.S. economy. Although railroads' relative position in the national transportation system declined from 1929 to 1970, its share of intercity (nonlocal) ton-miles remained fairly constant since the 1970s. In addition to moving bulk commodities, railroads move time-sensitive freight, such as motor vehicles and parts, mail, and international containers. Since partial economic deregulation in 1980, the railroads have increased their investment in plant and equipment and improved their service, while competition has led to decreased rates for shippers.

Most railroads in the United States are privately owned carriers; Amtrak is an exception, as are some small railroads owned by states and municipalities. The 12 major railroads, categorized as Class I, handle over 90 percent of total rail freight ton-miles, and account for over 90 percent of freight revenues.

Table 2-18 shows railroad industry expenditures in a form comparable to that of the WATS data on the trucking industry. In 1993, total expenditures of Class I railroads were \$26.3 billion. This was only slightly larger than the purchased transportation segment of trucking. Unfortunately, railroad data do not identify purchased transportation as a separate expenditure category.

TABLE 2-17: EXPENDITURES FOR PURCHASED
TRANSPORTATION BY TRUCKING COMPANIES, 1988-93
(MILLIONS OF CURRENT DOLLARS)

Type of company	1988	1989	1990	1991	1992	1993	Percentage change 1988-93
Vehicle leased with drivers	\$14,734	\$13,893	\$14,016	\$13,623	\$14,675	\$15,995	9%
Vehicle leased without drivers	3,159	3,459	3,742	3,907	4,289	4,469	41
Air, rail, water, and other motor carriers	2,553	2,544	2,747	2,661	3,223	3,416	34
All purchased transportation	\$20,446	\$19,896	\$20,505	\$20,191	\$22,187	\$23,880	17%

SOURCE: U.S. Department of Commerce, Bureau of the Census, *Motor Freight Transportation and Warehousing Survey: 1993* (Washington, DC: 1995).

TABLE 2-18: EXPENDITURES FOR THE CLASS I RAILROAD INDUSTRY, 1988-93
(MILLIONS OF CURRENT DOLLARS)

Cost items	1988	1989	1990	1991	1992	1993	Percentage change 1988-93
Annual payroll and benefits	\$11,541	\$11,814	\$11,316	\$10,806	\$10,726	\$10,642	-7.8%
Purchased fuels	1,564	1,796	2,170	1,968	1,913	1,962	25.4
Lease of equipment and rental	2,518	2,512	2,538	2,749	2,786	2,945	17.0
Insurance	1,256	1,403	1,246	1,734	1,195	1,248	-0.6
Depreciation	2,208	2,225	2,295	2,506	2,320	2,386	8.1
Taxes and licenses	1,048	981	1,162	1,173	1,124	1,339	27.8
Other	5,818	5,331	4,993	8,229	6,330	5,785	-0.6
Total	\$25,953	\$26,062	\$25,720	\$29,165	\$26,394	\$26,307	1.4%

SOURCE: American Association of Railroads, *AAR Factbook* (Washington, DC: 1994).

Between 1988 and 1993, railroad labor costs declined by 7.8 percent from \$11.5 billion to \$10.6 billion. Despite this decline, labor costs continue to be the main expenditure item for the railroad industry. Labor accounted for 40.5 percent of total expenditures in 1993, down from 44.5 percent in 1988 (see figure 2-13). During this same period, railroad expenditures on purchased fuel rose by 25 percent from \$1.6 billion to about \$2.0 billion. Not surprising, fuel cost as a proportion of total costs increased from 6.0 percent to 7.5 percent. As discussed in chapter 4, the energy efficiency of railroad freight operations improved significantly. Improvements in load factors accounted for 75 percent of the overall reduction in rail freight energy use.

Operating Performance and Revenues

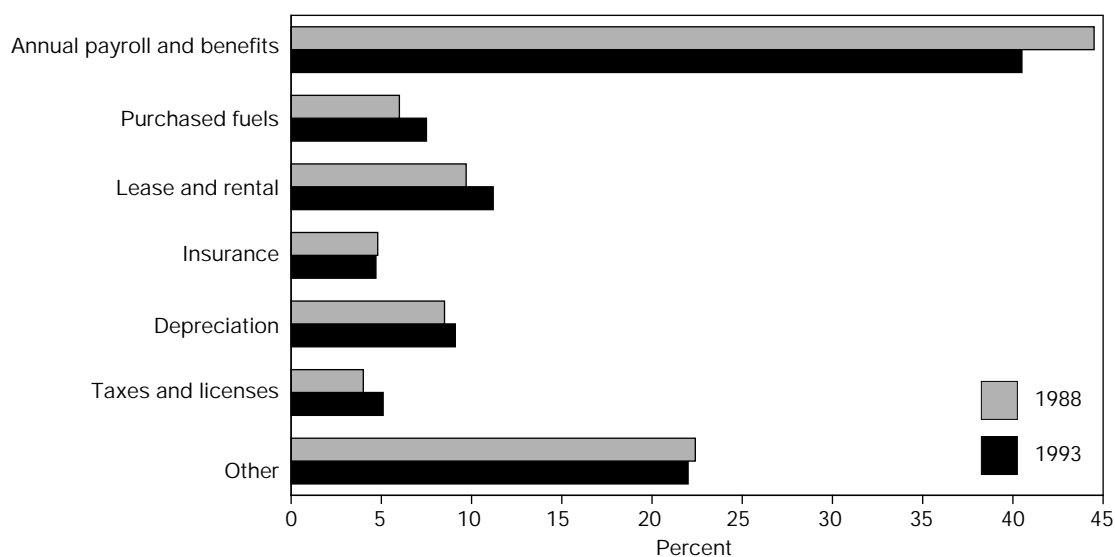
Recent trends in revenues and expenditures suggest that the industry's operating performance improved substantially between 1984 and 1993. The railroad industry's operating ratio (expenditures over revenues) declined from 87.6 percent in 1984 to 85.1 percent in 1993. Since 1984, net railway operating revenue increased by 18 percent, from \$3.6 billion in 1984 to \$4.3 bil-

lion in 1993 (see figure 2-14). The net loss of \$216 million experienced in 1991 was due to two factors: a steep rise in general and administrative expenses and a moderate increase in several costs, including maintenance, rights-of-way, structures, and equipment. Equipment is a major expenditure for the railroad industry. Despite the weak financial performance in 1991, the railroad industry appears to be recovering.

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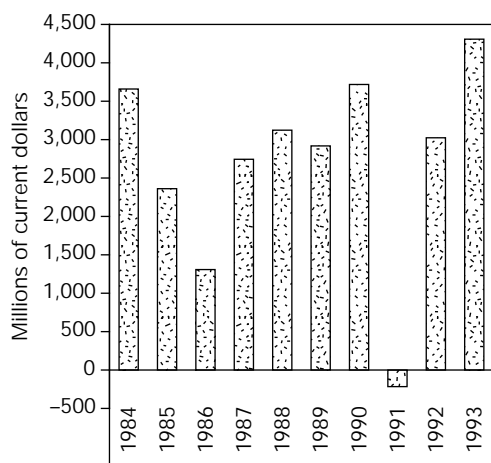
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FIGURE 2-13: CLASS I RAILROAD INDUSTRY
TOTAL EXPENDITURES BY COST ITEMS, 1988 AND 1993



SOURCE: American Association of Railroads, Economics, Policy and Statistics Department, *Railroad Facts* (Washington, DC: September 1995).

FIGURE 2-14: CLASS I RAILROADS
NET OPERATING REVENUE, 1984-93



SOURCE: American Association of Railroads, Economics, Policy and Statistics Department, *Railroad Facts* (Washington, DC: September 1995).

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